**Assignment 2**

**CHAPTER 4**

**QUESTION 1**

1. Consider the following 1D points: P = {0.872553, 0.933502, 0.668464, 0.206776, 0.653851, 0.0720516, }. Use Transform and Conquer approach (sort the data and design a simple algorithm) to find the closest pair. Write the index numbers of the closest points in next two boxes:   . Write the distance between them here:  .

**CHAPTER 5**

**QUESTION 1**

1. Consider the following data : {163, 76, 64, 198, 144, 83, 20, 147, 128, 15}, and a hash function h(K) = K mod 13. Fill the following hash table using close hashing with linear probing. All the cells that remain empty in the hash table, fill them with a value -1.

            

**CHAPTER 6**

**QUESTION 1**

1. A directed graph has 5 nodes and the following directed weighted edges: An edge of weight 1 from node 3 to 1; An edge of weight 4 from node 5 to 1; An edge of weight 4 from node 1 to 2; An edge of weight 2 from node 5 to 2; An edge of weight 4 from node 1 to 3; An edge of weight 4 from node 1 to 4; An edge of weight 5 from node 2 to 5; An edge of weight 3 from node 4 to 5; Construct the weight matrix W to represent this graph. Use Floyd Algorithm to find the Distance Matrix D giving the shortest distance from every node to the other nodes. Write the last row of the Distance Matrix here.

    

**QUESTION 2**

1. A directed graph has 6 nodes and the following direct paths: from node 2 to 1; from node 6 to 1; from node 3 to 2; from node 2 to 5; from node 3 to 5; from node 1 to 6; Construct the adjacency matrix A to represent this graph. Use the Warshall Algorithm to find the Transitive Closure T. Write the last row of the Transitive Closure here.

     

**QUESTION 3**

1. Using the dynamic programming approach, solve the following knapsack problem: The capacity of the knapsack W = 10. The number of available items = 4. The weights of the items w = ( 2 1 1 5 ). The values of the items v = ( 7 4 10 1 ). Construct the table and use backtracking to answer the following questions:

Was item 1 picked? (write 1 if picked and 0 otherwise) 

Was item 2 picked? (write 1 if picked and 0 otherwise) 

Was item 3 picked? (write 1 if picked and 0 otherwise) 

Was item 4 picked? (write 1 if picked and 0 otherwise) 

What is the total value of the picked items? 

What is the total weight of the picked items? 

**CHAPTER 7**

**QUESTION 1**

1. An undirected graph has 6 nodes and the following weighted edges: Edge1 with weight 11 between node a and d, Edge2 with weight 1 between node c and d, Edge3 with weight 13 between node a and e, Edge4 with weight 2 between node b and e, Edge5 with weight 15 between node d and e, Edge6 with weight 4 between node b and f, Edge7 with weight 5 between node c and f, Edge8 with weight 7 between node e and f,. Use Prim Algorithm to find the minimum spanning tree for this graph and answer the following questions: How many edges are there in the tree?:  What is the total weight of the tree:  Are following edges in the tree? Write 1 for YES and 0 for NO. Edge1  Edge2  Edge3  Edge4  Edge5  Edge6  Edge7  Edge8 

**QUESTION 2**

1. A directed graph has 5 nodes and the following directed weighted edges: An edge of weight 9 from node A to B; An edge of weight 8 from node D to B; An edge of weight 1 from node E to C; An edge of weight 10 from node E to D; An edge of weight 5 from node B to E; Use Dijkstra Algorithm to find the minimum distance from vertex A to all other vertices, and answer the following questions: What is the distance from vertex A to vertex B  ? What is the distance from vertex A to vertex E  ? What is the distance from vertex A to vertex C  ? What is the distance from vertex A to vertex D  ? Note: Write INF if a node is not reachable.

**QUESTION 3**

1. Encode the following text using Huffman coding : HVHOHO2282 Use the following steps: a. Construct the frequency table. b. Construct the Huffman tree. c. Assign codewords to each symbol. d. Write the encoded bit-stream. e. How many bits are in the encoded bit-stream?. Note: You just need to answer part e. Count the bits carefully. Only the exact answer will get marks. 